FUJITSU

SPARC Enterprise
M8000/M9000 Servers

Overview Guide

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FUJITSU

SPARC® Enterprise M8000/M9000 Servers Overview Guide

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Preface

This manual, the *SPARC Enterprise M8000/M9000 Servers Overview Guide* , describes system features, system configurations, hardware functions, and software functions of the SPARC® Enterprise SPARC Enterprise M8000/M9000servers.

This section explains:

- "Structure and Contents of This Manual" on page xiii
- "SPARC Enterprise M8000/M9000 Servers Documentation" on page xiv
- "Text Conventions" on page xvi
- "Prompt Notations" on page xvi
- "Syntax of the Command Line Interface (CLI)" on page xvii
- "Environment Requirements for Using This Product" on page xvii
- "Conventions for Alert Messages" on page xvii
- "Notes on Safety" on page xviii
- "Alert Labels" on page xxii
- "Product Handling" on page xxv
- "Fujitsu Welcomes Your Comments" on page xxvii

Structure and Contents of This Manual

This manual is organized as described below:

- Chapter 1 System Overview

  Provides an overview of the SPARC Enterprise SPARC Enterprise M8000/M9000 servers.

- Chapter 2 System Features

  Describes system features and functions.

- Chapter 3 About Software

  Describes the software.

Glossary and Index

- Glossary

  Explains the terms used in this manual.

- Index

  Provides keywords and corresponding reference page numbers so that the reader can easily search for items in this manual as necessary.

SPARC Enterprise M8000/M9000 Servers Documentation

The manuals listed below are provided for reference.

Book Titles	Manual Codes
SPARC Enterprise M8000/M9000 Servers Site Planning Guide	C120-H014
SPARC Enterprise Equipment Rack Mounting Guide	C120-H016
SPARC Enterprise M8000/M9000 Servers Getting Started Guide	C120-E323
SPARC Enterprise M8000/M9000 Servers Overview Guide	C120-E324
Important Safety Information for Hardware Systems	C120-E391
SPARC Enterprise M8000/M9000 Servers Safety and Compliance Guide	C120-E326
SPARC Enterprise M8000/M9000 Servers Unpacking Guide	C120-E327
SPARC Enterprise M8000/M9000 Servers Installation Guide	C120-E328
SPARC Enterprise M8000/M9000 Servers Service Manual	C120-E330
External I/O Expansion Unit Installation and Service Manual	C120-E329
SPARC Enterprise M4000/M5000/M8000/M9000 Servers RCI Build Procedure	C120-E361
SPARC Enterprise M4000/M5000/M8000/M9000 Servers Administration Guide	C120-E331
SPARC Enterprise M4000/M5000/M8000/M9000 Servers XSCF User's Guide	C120-E332
SPARC Enterprise M4000/M5000/M8000/M9000 Servers XSCF Reference Manual	C120-E333
SPARC Enterprise M4000/M5000/M8000/M9000 Servers Dynamic Reconfiguration (DR) User's Guide	C120-E335

Book Titles	Manual Codes
SPARC Enterprise M4000/M5000/M8000/M9000 Servers Capacity on Demand (COD) User's Guide	C120-E336
SPARC Enterprise M4000/M5000/M8000/M9000 Servers RCI User's Guide	C120-E360
SPARC Enterprise M8000/M9000 Servers Product Notes	C120-E325

1. Manuals on the Web

   The latest versions of all the SPARC Enterprise Series manuals are available at the following websites. The latest manuals can be downloaded in a batch.

   Global Site

   `http://www.fujitsu.com/sparcenterprise/manual/`

   Japanese Site

   `http://primeserver.fujitsu.com/sparcenterprise/manual/`

Note – Product Notes is available on the website only. Please check for the recent update on your product.

2. Documentation CD

   For the Documentation CD, please contact your local sales representative.

   - SPARC Enterprise M8000/M9000 Servers Documentation CD (C120-E364)

3. Manual included on the Enhanced Support Facility x.x CD-ROM disk
   - Remote maintenance service

Book Title	Manual Code
Enhanced Support Facility User's Guide for REMCS	C112-B067

4. Provided in system

   Man page of the XSCF

Note – The man page can be referenced on the XSCF shell, and it provides the same content as the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers XSCF Reference Manual*.

5. Solaris Operating System Related Manuals

   `http://docs.sun.com`

6. Information on Using the RCI function

   The manual does not contain an explanation of the RCI build procedure. For information on using the RCI function, refer to the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers RCI Build Procedure* and *SPARC Enterprise M4000/M5000/M8000/M9000 Servers RCI User's Guide* provided on the website.

Text Conventions

This manual uses the following fonts and symbols to express specific types of information.

Fonts/symbols	Meaning	Example
AaBbCc123	What you type, when contrasted with on-screen computer output	# **ls -l** <Return>
AaBbCc123	The names of commands, files, and directories; on-screen computer output	# ls -l <Return>
Italic	Indicates the name of a reference manual	See the *XSCF User's Guide*.
" "	Indicates names of chapters, sections, items, buttons, or menus	See Chapter 2, "Preparation for Installation."

Prompt Notations

The following prompt notations are used in this manual.

Shell	Prompt Notations
XSCF	XSCF>
C shell	machine-name%
C shell super user	machine-name#
Bourne shell and Korn shell	$
Bourne shell and Korn shell super user	#
OpenBoot PROM	ok

Syntax of the Command Line Interface (CLI)

The command syntax is as follows:

- A variable that requires input of a value must be enclosed in <>.
- An optional element must be enclosed in [ ].
- A group of options for an optional keyword must be enclosed in [ ] and delimited by |.
- A group of options for a mandatory keyword must be enclosed in {} and delimited by |.
- The command syntax is shown in a box.

Example:

```
XSCF> showuser -a
```

Environment Requirements for Using This Product

This product is a computer that is intended to be used in a computer room.

Conventions for Alert Messages

This manual uses the following conventions to show alert messages, which are intended to prevent injury to the user or bystanders as well as property damage, and important messages that are useful to the user.

WARNING:
This indicates a hazardous situation that could result in death or serious personal injury (potential hazard) if the user does not perform the procedure correctly.

CAUTION:
This indicates a hazardous situation that could result in minor or moderate personal injury if the user does not perform the procedure correctly. This signal also indicates that damage to the product or other property may occur if the user does not perform the procedure correctly.

IMPORTANT:
This indicates information that could help the user to use the product more effectively.

Alert Messages in the Text

An alert message in the text consists of a signal indicating an alert level followed by an alert statement. Alert messages are indented to distinguish them from regular text. Also, a space of one line precedes and follows an alert statement.

WARNING:
The tasks listed below for this product and optional product provided by Fujitsu Siemens Computers should be performed only by authorized service personnel.

The user must not perform these tasks. Incorrect operation of these tasks may cause electric shock, injury, or fire.

- Installation and reinstallation of all components
- Removal of front, rear, or side covers
- Mounting/unmounting of optional internal devices
- Connecting/disconnecting of external interface cables
- Maintenance (repair and regular diagnosis and maintenance)

Also, important alert messages are shown in "Important Alert Messages" on page xviii.

Notes on Safety

Important Alert Messages

This manual provides the following important alert signals:

Caution – The WARNING signal indicates a dangerous situation could result in death or serious injury if the user does not perform the procedure correctly.

Task	Warning
Normal operation	**Electric shock, fire** Do not damage, break, or modify the power cables. Cable damage may cause electric shock or fire.

Caution – The CAUTION signal indicates a hazardous situation could result in minor or moderate personal injury if the user does not perform the procedure correctly. This signal also indicates that damage to the product or other property may occur if the user does not perform the procedure correctly.

Task	Warning
Normal operation	**Equipment damage** Be sure to follow the precautions below when installing the main unit. Otherwise, the equipment may be damaged. • Do not block ventilation slits. • Avoid installing the equipment in a placed exposed to direct sunlight or near equipment that becomes extremely hot. • Avoid installing the equipment in a dusty place or a place directly exposed to corrosive gas or salty air. • Avoid installing the equipment in a placed exposed to strong vibration. Also, install the equipment on a level surface so that it is stable. • The grounding wire must be class 3 or higher. Connecting it with another grounding wire for shared grounding may cause a malfunction. Be sure to use a single grounding path for the grounding wire. • Do not run any cable beneath any equipment. Also, prevent cables from becoming taut. Never disconnect any power cable from the equipment while power is being supplied to the equipment. • Do not place anything on top of the main unit. Do not use the main unit as a workspace. • Avoid exposing the equipment to rapid changes in the ambient temperature, such as a rapid increase during transport in winter. A rapid increase in the ambient temperature causes moisture to condense in the equipment. Use the equipment only after the difference between its temperature and the ambient temperature is negligible. • Avoid installing the equipment near a copy machine, air conditioner, or welding machine, which is noisy. • Take preventive action to minimize static electricity at the installation location. Note that static electricity is easily generated in some carpets and can cause the equipment to malfunction. • Confirm that the power supply voltage and frequency during operation match the rated values indicated on the equipment. • Do not insert any object into an opening in the equipment. Components inside the equipment use high voltage. Conductive foreign matter, such as a metal object, inserted into the equipment, may cause a short circuit between components, resulting in fire, electric shock, or equipment damage. • For maintenance of the equipment, contact your authorized service personnel.

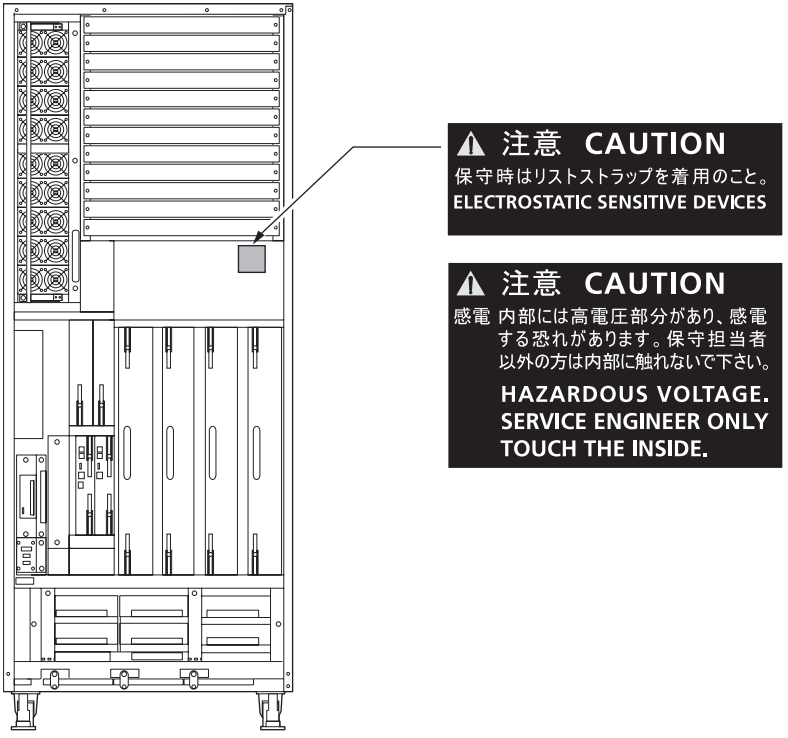
Task	Warning
Normal operation	**Data destruction** Confirm the items listed below before turning off the power. Otherwise, data may be destroyed. • All applications have completed processing. • No user is using the equipment. • When the main unit power is turned off, the Power LED on the operation panel is turned off. Be sure to confirm that the Power LED is off before turning off the main power (uninterruptible power supply [UPS], power distribution box, main line switch, etc.). If necessary, back up files before turning off the system power. **Data destruction** Do not forcibly stop a domain that is operating normally. Otherwise, data may be destroyed. **Data destruction** Do not disconnect the power cable from the AC power input while power is being supplied. Otherwise, data stored on hard disk units may be destroyed.

Alert Labels

The labels shown below are affixed on this product. These labels provide information for users of the product:

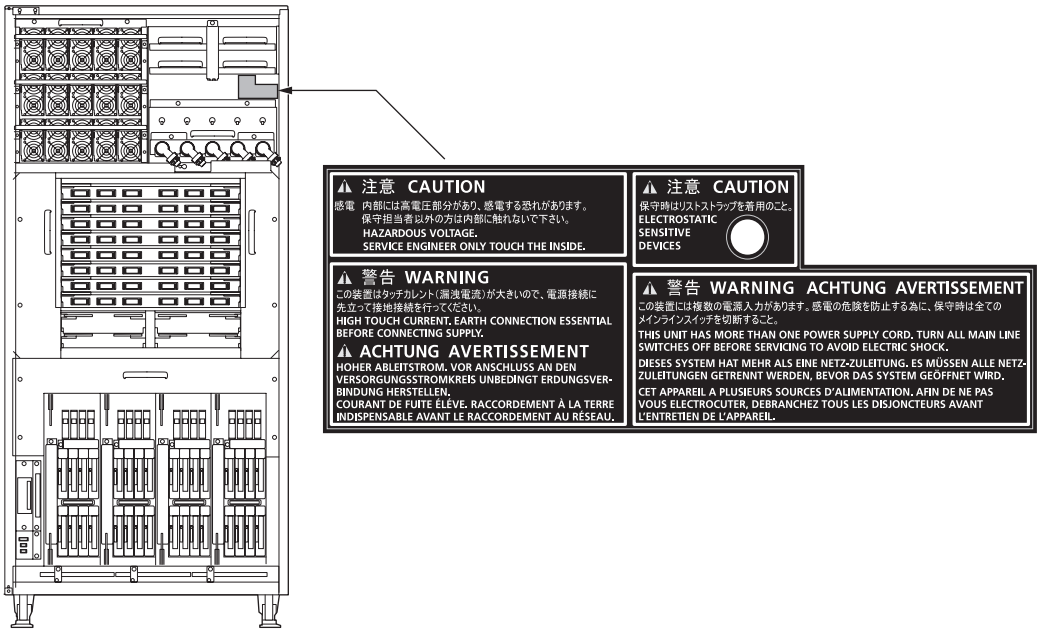
Caution – Do not peel off the labels.

- M8000

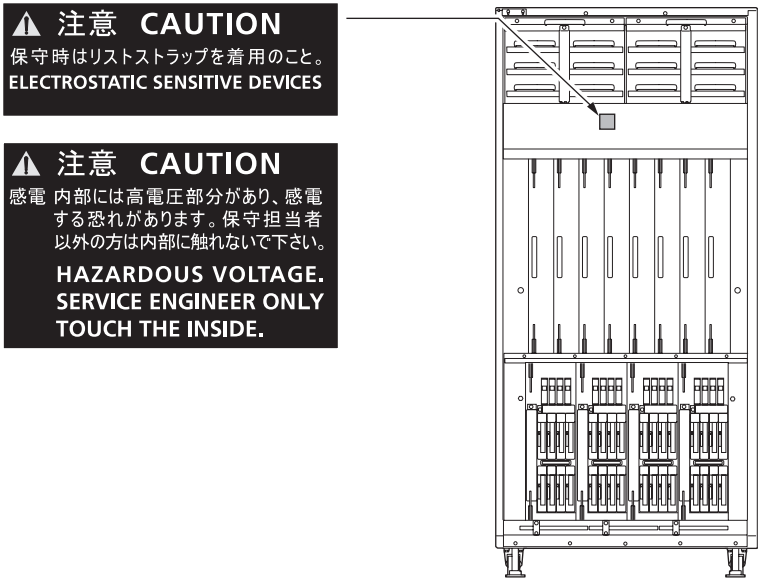


M8000 (Front View)

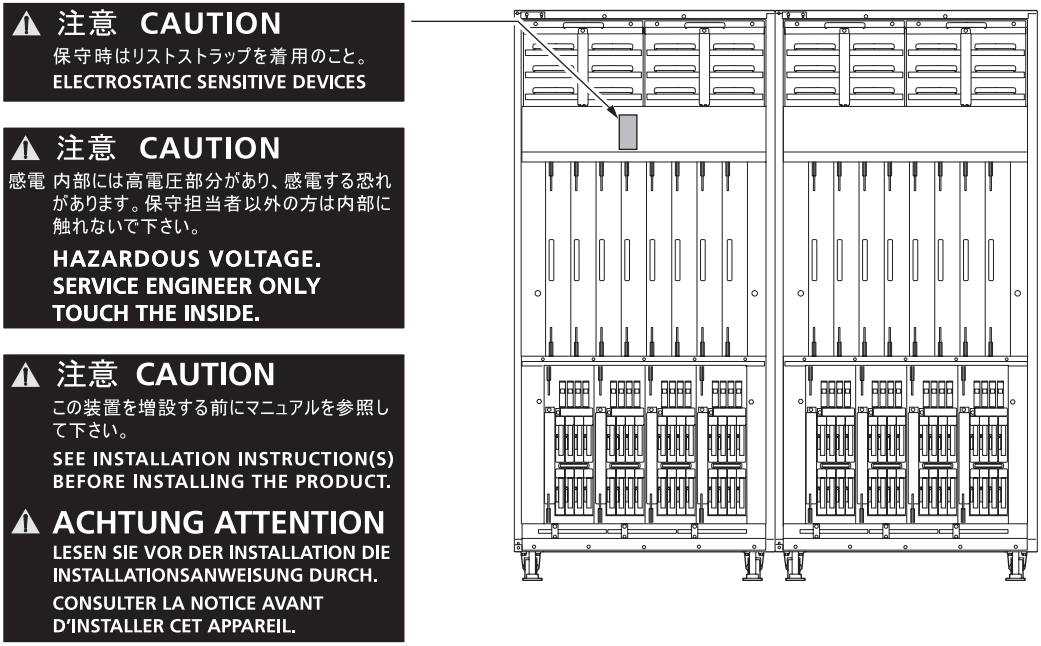
■ M9000


⚠ 注意 CAUTION
感電 内部には高電圧部分があり、感電する恐れがあります。
保守担当者以外の方は内部に触れないで下さい。
HAZARDOUS VOLTAGE.
SERVICE ENGINEER ONLY TOUCH THE INSIDE.
⚠ 注意 CAUTION
保守時はリストストラップを着用のこと。
ELECTROSTATIC
SENSITIVE
DEVICES
⚠ 警告 WARNING
この装置はタッチカレント(漏洩電流)が大きいので、電源接続に
先立って接地接続を行ってください。
HIGH TOUCH CURRENT. EARTH CONNECTION ESSENTIAL
BEFORE CONNECTING SUPPLY.
⚠ ACHTUNG AVERTISSEMENT
HOHER ABLEITSTROM. VOR ANSCHLUSS AN DEN
VERSORGUNGSSTROMKREIS UNBEDINGT ERDUNGSVER-
BINDUNG HERSTELLEN.
COURANT DE FUITE ÉLÉVE. RACCORDEMENT À LA TERRE
INDISPENSABLE AVANT LE RACCORDEMENT AU RÉSEAU.
⚠ 警告 WARNING ACHTUNG AVERTISSEMENT
この装置には複数の電源入力があります。感電の危険を防止する為に、保守時は全ての
メインラインスイッチを切断すること。
THIS UNIT HAS MORE THAN ONE POWER SUPPLY CORD. TURN ALL MAIN LINE
SWITCHES OFF BEFORE SERVICING TO AVOID ELECTRIC SHOCK.
DIESES SYSTEM HAT MEHR ALS EINE NETZ-ZULEITUNG. ES MÜSSEN ALLE NETZ-
ZULEITUNGEN GETRENNT WERDEN, BEVOR DAS SYSTEM GEÖFFNET WIRD.
CET APPAREIL A PLUSIEURS SOURCES D'ALIMENTATION. AFIN DE NE PAS
VOUS ELECTROCUTER, DEBRANCHEZ TOUS LES DISJONCTEURS AVANT
L'ENTRETIEN DE L'APPAREIL.

M9000 (Front View)



M9000 (Rear View)



M9000 with Expansion Cabinet (Rear View)

Product Handling

Maintenance

Caution – Certain tasks in this manual should only be performed by a certified service engineer. User must not perform these tasks. Incorrect operation of these tasks may cause electric shock, injury, or fire.

- Installation and reinstallation of all components, and initial settings
- Removal of front, rear, or side covers
- Mounting/de-mounting of optional internal devices

- Plugging or unplugging of external interface cards
- Maintenance and inspections (repairing, and regular diagnosis and maintenance)

Caution – The following tasks regarding this product and the optional products provided from Fujitsu Siemens Computers should only be performed by a certified service engineer. Users must not perform these tasks. Incorrect operation of these tasks may cause malfunction.

- Unpacking optional adapters and such packages delivered to the users
- Plugging or unplugging of external interface cards

Remodeling/Rebuilding

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Otherwise, electric shock, injury or fire may result.

Emission of Laser Beam (Invisible)

Caution – The main unit and high-speed optical interconnect cabinet contain modules that generate invisible laser radiation.
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CHAPTER 1

System Overview

This chapter provides an overview of features, specifications, and configurations of the SPARC® Enterprise M8000/M9000 Servers.

- Product Overview
- System Specifications
- Server Components
- Component Mounting Conditions
- Optional Products
- Software Features

1.1 Product Overview

SPARC Enterprise M8000/M9000 servers have been developed as UNIX servers using a symmetric multi-processing (SMP) architecture. Each of these systems merges mainframe technologies for high reliability, and the associated know-how accumulated over time, with the high-speed technologies of super computers and the openness of UNIX server development.

If a problem occurs during operation, the errors causing them can be corrected or isolated without stopping the system. This feature minimizes problems in many cases, thereby improving job continuity.

Each SPARC Enterprise M8000/M9000 Servers contains one or more SPARC64 VI CPUs. They can operate as multiple servers that permit flexible use of resources, including more efficient execution of job operations.

Each server consists of a cabinet containing various mounted components, a front door, rear door, and side covers as parts of the server structure.

An operator panel is mounted on the front door and is always accessible. Take special care in handling and storing the dedicated key is provided for the front door and the operator panel.

FIGURE 1-1 through FIGURE 1-3 show exterior views of the servers.

SPARC Enterprise M8000 Server Appearance

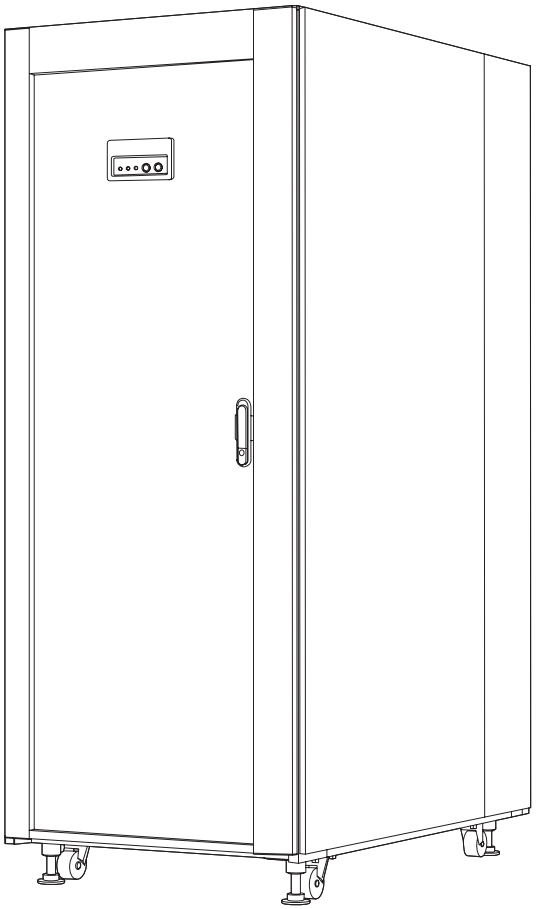


FIGURE 1-1 SPARC Enterprise M8000 Server

SPARC Enterprise M9000 Server (Base Cabinet Only) Appearance

FIGURE 1-2 SPARC Enterprise M9000 Server (Base Cabinet Only)

SPARC Enterprise M9000 Server (With an Expansion Cabinet) Appearance

The expansion cabinet is an M9000 option connected to the M9000 (type for the base cabinet only).

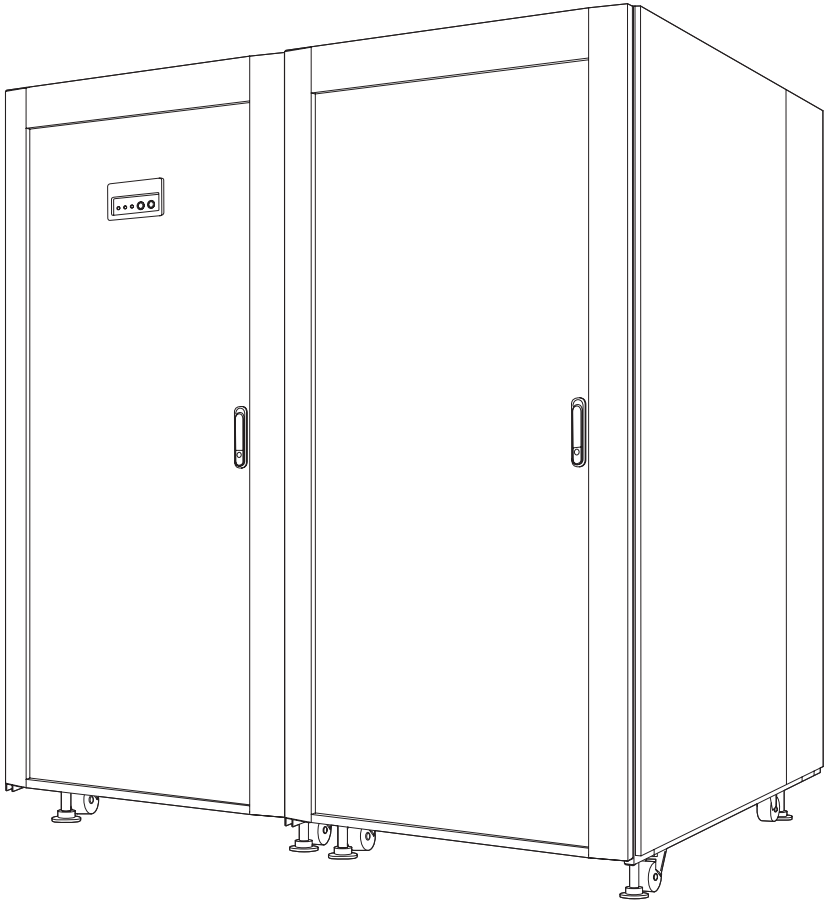


FIGURE 1-3 SPARC Enterprise M9000 Server (With an Expansion Cabinet)

SPARC Enterprise M8000/M9000 servers have the following features:

- Multicore SPARC64 VI gigahertz processors

  These processors provide superior performance, due to their high scalability allowing expansion to up to 64 dual-core CPU modules, and technologies enabling high-speed arithmetic operations and data transfers.

As faster and higher-performing CPU modules become available, they can be added to or replace existing installed CPU modules to further improve performance.

The system uses symmetric multiple-processing (SMP), so each CPU can access any part of system memory regardless of its mounting location. Adding more CPUs does not affect memory access to any of the installed CPUs.

- High-speed crossbar-type system bus

  The high-speed crossbar-type system bus provides high-speed wide-band data transfer.

- ECC memory

  ECC functionality protects data on all system buses and in memory, so that any errors in data are automatically corrected. In addition to ECC memory, Chipkill memory protection is supported.

- PCIe is mounted as I/O buses

  PCIe, with a maximum bus width of eight lanes is used for the inter-connect bus with the I/O device.

- An optional External I/O Expansion Unit enables I/O slot expansion in the system

  Connect an External I/O Expansion Unit to add more PCIe and PCI-X slots to the server.

  An External I/O Expansion Unit is connected by a cable to a link card plugged into a PCIe slot in an I/O unit.

- The main components, power supply units, and FAN units can be configured to be redundant

  Redundant configurations can be used for the main components, such as a power supply unit, FAN unit, hard disk unit, and PCI card. Implementation of redundant configurations enables operation to continue without interruption even if one of the units making up part of the system fails.

- The main components, power supply units, and FAN units support active replacement/addition

  Component replacement and addition during system operation supported for the main components, such as a power supply unit, FAN unit, hard disk unit, System Control Facility (board), system board, and PCI card, with some exceptions.

  Dynamic reconfiguration (DR) is used for active replacement and addition of CMU and IOU configuring the system board.

  PCI hot-plug (PHP) function enables replacement and addition of PCI Cards while the system is running.

- Automatic reboot on failure

If a failure occurs, the faulty component is automatically isolated from the system, and the system is rebooted. If 1-bit errors occur frequently in the cache memory configuring a CPU, the faulty memory can be dynamically isolated without rebooting the Solaris Operating System. This type of graceful degradation function enables the operation of the other resources to continue without interruption, and also provides high fault-tolerance in case of failure.

- eXtended System Control Facility (XSCF)

  SPARC Enterprise M8000/M9000 servers use service processor called the eXtended System Control Facility (XSCF), which monitors abnormalities in hardware conditions, the operating status of domains, and system conditions such as the temperature, power supply, and fan operation.

  You can configure the system to selectively degrade a faulty component for operation if an error is detected.

  Scheduling is supported to enable automatic power-on and power-off of the SPARC Enterprise system according to the specified operation schedule.

  The console of each domain can be controlled from the XSCF via a network.

  A browser-based user interface (BUI) and the command line interface (CLI) facilitate operations for making configuration changes and status monitoring in the system.

Note – A console display terminal is required for console control. Prepare it before installation. The devices that can be used as the terminal are listed below.

- PC
- Workstation
- ASCII terminal
- Terminal server (or a touch panel connected to a terminal server)

Note – For the console connection method, see the *SPARC Enterprise M8000/M9000 Servers Installation Guide.*

- Partitioning function

  One high-end server can be divided into multiple areas, or domains, for more effective scalability. Each domain manages resources in linkage with the XSCF. A domain may consist of optimized resources depending on its intended use, enabling more efficient system configurations.

  Dynamic Reconfiguration (DR) enables adding, deleting, and relocating resources of domains without stopping processing in the domain. This enables dynamic reconfiguration of resources without stopping a job, even when the job load increases suddenly or when a faulty component is replaced.
  For details on domain functions, see the *SPARC Enterprise*

M4000/M5000/M8000/M9000 Servers Administration Guide.
For details of the DR function, see the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers Dynamic Reconfiguration (DR) User's Guide.*

- The Solaris™ Operating System (Solaris 10 or later) is supported.

  With an added function for error prediction and self-recovery by the system (Predictive Self-Healing) and enhanced process privilege management and network functions, the Solaris Operating System sets new standards for performance, efficiency, availability, and security.

- Capacity on Demand (CoD)

  Supports Capacity on Demand (CoD), which enables instantaneous increases in the CPU capacity according to increases in the job load. Spare CPUs that are mounted in advance can be used immediately upon purchase of a corresponding number of CPU licenses, thereby accommodating such needs for increased processing capacity.
  For details, see the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers Administration Guide.*

1.2 System Specifications

This section lists specifications of both high-end servers, shows their appearance, and provides an overview of the operator panel.

1.2.1 Main Unit Specifications

TABLE 1-1 to TABLE 1-4 list specifications of both high-end servers, installation specifications, ambient conditions, and power conditions.

TABLE 1-1 Main Unit Specifications *(1 of 2)*

Item		M8000	M9000 Base cabinet only	M9000 Base cabinet + expansion cabinet
Type		Floor-stand type [3]		
CPU	Type	SPARC64 VI		
	Number of CPUs	32 cores (maximum 16 CPU modules)	64 cores (maximum 32 CPU modules)	128 cores (maximum 64 CPU modules)
Main storage (memory module)	Maximum memory size	1 TB [4]	2 TB [4]	4 TB [4]
	Error checking function	Error Checking and Correction (ECC)		
PCI slot built into SPARC Enterprise (PCI Express) [1]		Maximum 32 slots	Maximum 64 slots	Maximum 128 slots
External I/O Expansion Unit (maximum number of connections)		8 units (16 boats)	16 units (32 boats)	16 units (32 boats)
Maximum number of slots, with I/O boats mounted		112 slots	224 slots	288 slots
Hard disk drive [2]		16 slots	32 slots	64 slots
DVD-ROM drive		1 drive		2 drives
Tape drive		1 drive can be mounted (option)		2 drives can be mounted (option)
Fan unit		4 units (type A) 8 units (type B)	16 units (type A)	32 units (type A)
Power supply unit (Maximum number of mounted units) (single phase, one system)		9 units	15 units	30 units
Redundant configuration		Power supply unit, FAN unit, XSCF, power system (dual power feed option), and clock supply system		
Components that can be hot-swapped		CPU/Memory board unit, I/O unit, System Control Facility, disk, PCI Card, DVD-ROM drive, tape drive, External I/O Expansion Unit		

TABLE 1-1 Main Unit Specifications *(2 of 2)*

Item	M8000	M9000 Base cabinet only	M9000 Base cabinet + expansion cabinet
System control interface	LAN, serial, uninterruptible power supply (UPS) interface, remote cabinet interface (RCI), and USB [5]		
Number of domains	16	24	24
Operating environment	Solaris Operating System [6]		

1 Up to eight lanes of PCIe bus are connected to each slot.

2 A built-in IOU Onboard Device Card_A (IOUA) is required for using hard disk drives.

3 The upper part of the SPARC Enterprise M8000 server cabinet has a 12 rack units (RU) space.

4 This is the maximum capacity when 8-GB dual inline memory modules (DIMM) are mounted.

5 This interface is only used for maintenance by authorized service personnel. It does not support general-purpose USB devices.

6 For the latest information on the operating system, visit our Web site, or contact your sales representative. For up-to-date URL information, see the Web site information about the messages described in the reference manuals noted in the Preface.

1.2.2 Installation Specifications

TABLE 1-2 Installation Specifications

Item		M8000	M9000 Base cabinet only	M9000 Base cabinet + expansion cabinet
Outside dimensions	Width [mm]	750	850	1674
	Depth [mm]	1260	1260	1260
	Height [mm]	1800	1800	1800
Weight [kg]		700	940	1880

1.2.3 Environmental Specifications

TABLE 1-3 Environmental Specifications

	Temperature [°C (°F)]		Humidity [%RH][1]	
Server name	**Operating**	**Non-operating**	**Operating**	**Non-operating**
SPARC Enterprise M8000 Server and SPARC Enterprise M9000 Server	5 to 32 (41 to 89.6) at an installation altitude ranging from 0 to less than 1,500 m (4921 feet) above sea level 5 to 30 (41 to 86) at an installation altitude ranging from 1500 m (4921 feet) to less than 2000 m (6562 feet) above sea level 5 to 28 (41 to 82.4) at an installation altitude ranging from 2000 m (6562 feet) to less than 2500 m (8202 feet) above sea level 5 to 26 (41 to 78.8) at an installation altitude ranging from 2500 m (8202 feet) to 3000 m (9843 feet) above sea level	0 to 50 (32 to 122)	20 to 80	8 to 80

1 Noncondensing.

1.2.4 Power Specifications

Two power input modes are available; single-phase power feed and three-phase power input.

The following table lists power conditions for the single-phase power feed.

TABLE 1-4 Power Specifications

Item		M8000	M9000 Base cabinet only	M9000 Base cabinet + expansion cabinet
Input power: Single-phase power input	Voltage [V]	AC200 to 240 ±10%		
	Frequency [Hz]	50/60 (+2% / -4%)		
Power consumption [kW]		10.5 [1]	21.3 [2]	42.6 [3]
Apparent power [kW]		11.0 [1]	22.4 [2]	44.8 [3]
Power conditions	Power Input cable [m]	3.0		
	Plug shape	Japan: 30 A-250 V, 4P hook lock (The wiring between X and Y must be single-phase 200-VAC wiring.) North America: NEMA L6-30P Europe: EN60309 (32A)		
	Number of plugs	3 (single power feed) 6 (dual power feed)	5 (single power feed) 10 (dual power feed)	10 (single power feed) 20 (dual power feed)

1 This value applies if 4 CPU/Memory Board Units and 4 I/O units are mounted.

2 This value applies if 8 CPU/Memory Board Units and 8 I/O units are mounted.

3 This value applies if 16 CPU/Memory Board Units and 16 I/O units are mounted.

To use a three-phase power source, a three-phase power feed option and a power supply cabinet for mounting the option are required. The three-phase power feed has two connection options: a star connection that connects a neutral line and each phase, and a delta connection that connects each phase.

For details on specifications for the three-phase power feed, see the *SPARC Enterprise M8000/M9000 Servers Site Planning Guide.*

1.2.5 M8000 Server Components

FIGURE 1-4 shows the front of the SPARC Enterprise M8000 Server with a power cabinet connected to it, and FIGURE 1-5 shows the server rear view. System component names are shown in each figure.

The dual power feed option and three-phase power feed option can be mounted in the power cabinet. One power cabinet is connected to the M8000.

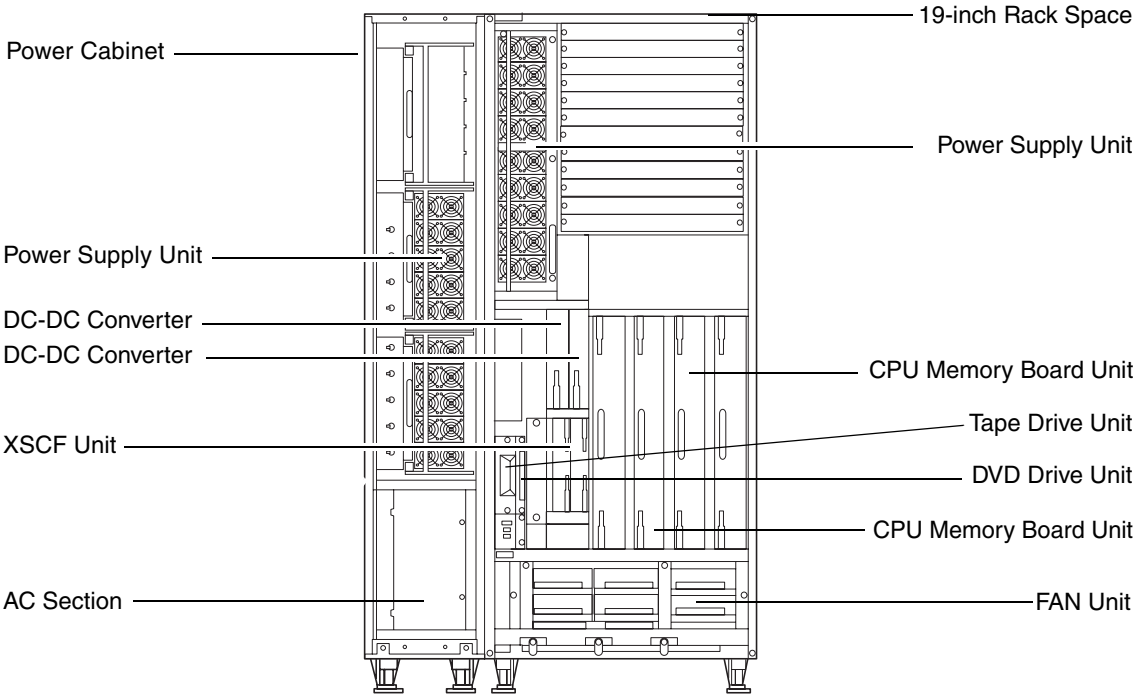


FIGURE 1-4 M8000 and Power Cabinet Front View

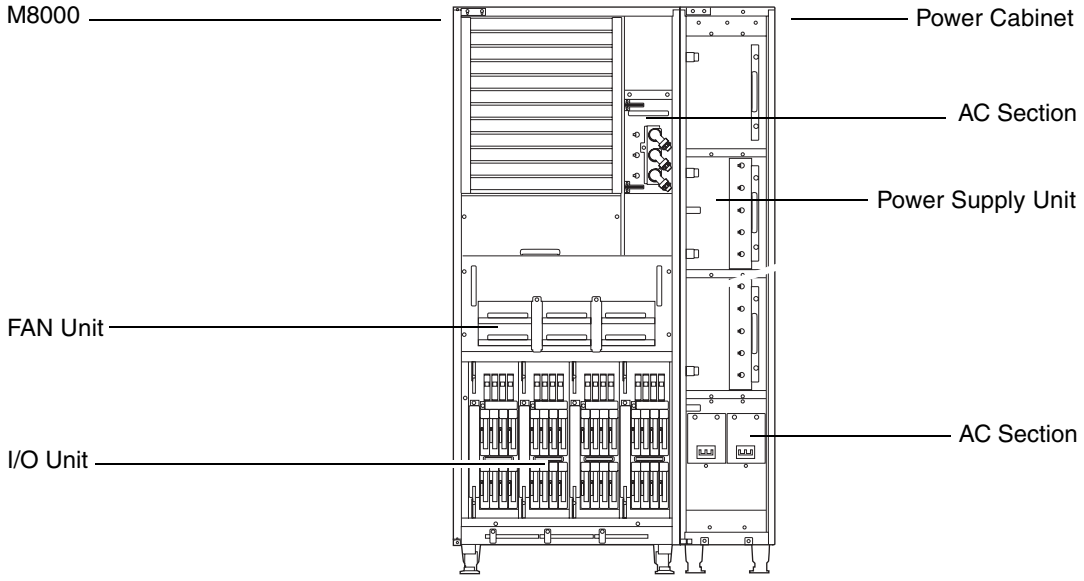


FIGURE 1-5 M8000 and Power Cabinet Rear View

1.2.6 M9000 Server Components (Base Cabinet Only)

FIGURE 1-6 shows the front of the SPARC Enterprise M9000 Server (base cabinet only) with a power cabinet connected to it, and FIGURE 1-7 shows the rear of the server. The names of components of the system are shown in each figure.
One power cabinet is connected to the M9000 (base cabinet only).

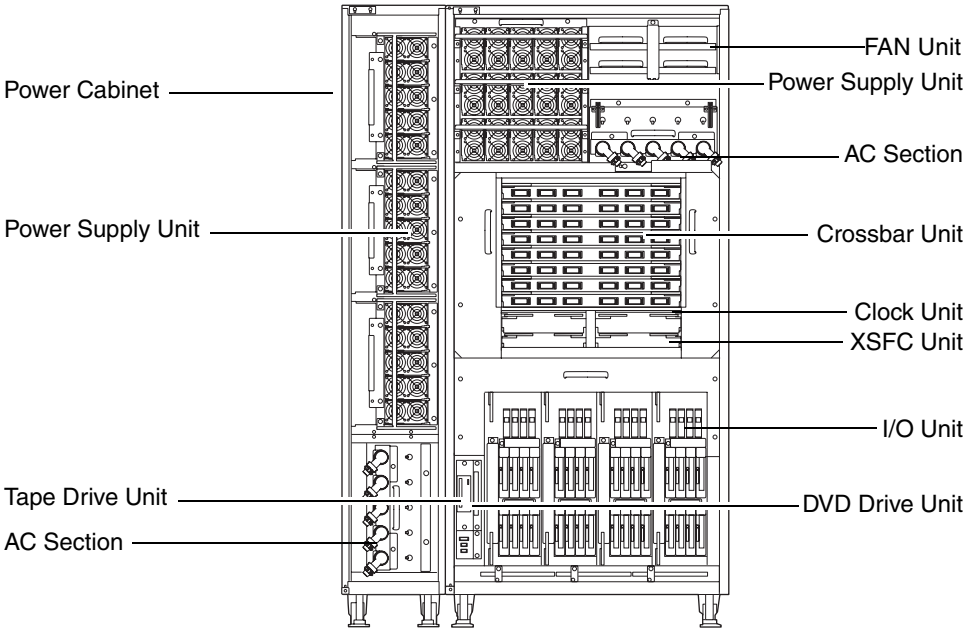


FIGURE 1-6 M9000 (Base Cabinet Only) and Power Cabinet Front View

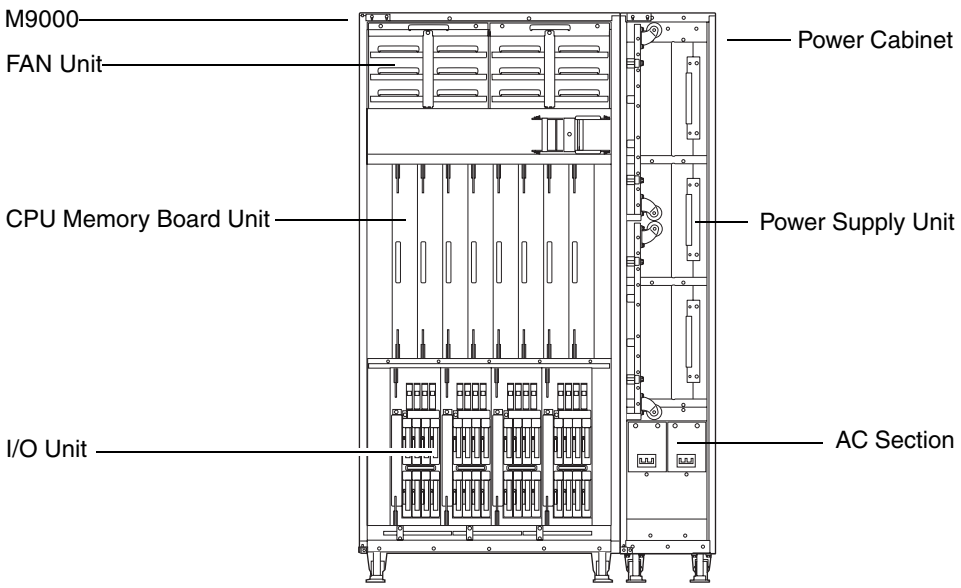


FIGURE 1-7 M9000 (Base Cabinet Only) and Power Cabinet Rear View

1.2.7 M9000 Server Components (With an Expansion Cabinet)

FIGURE 1-8 shows the front of the SPARC Enterprise M9000 Server (with an expansion cabinet) with a power cabinet connected to it, and FIGURE 1-9 shows the rear of the server. The names of components of the Server are shown in each figure. One power cabinet is connected to each of the M9000 base cabinet and expansion cabinet.

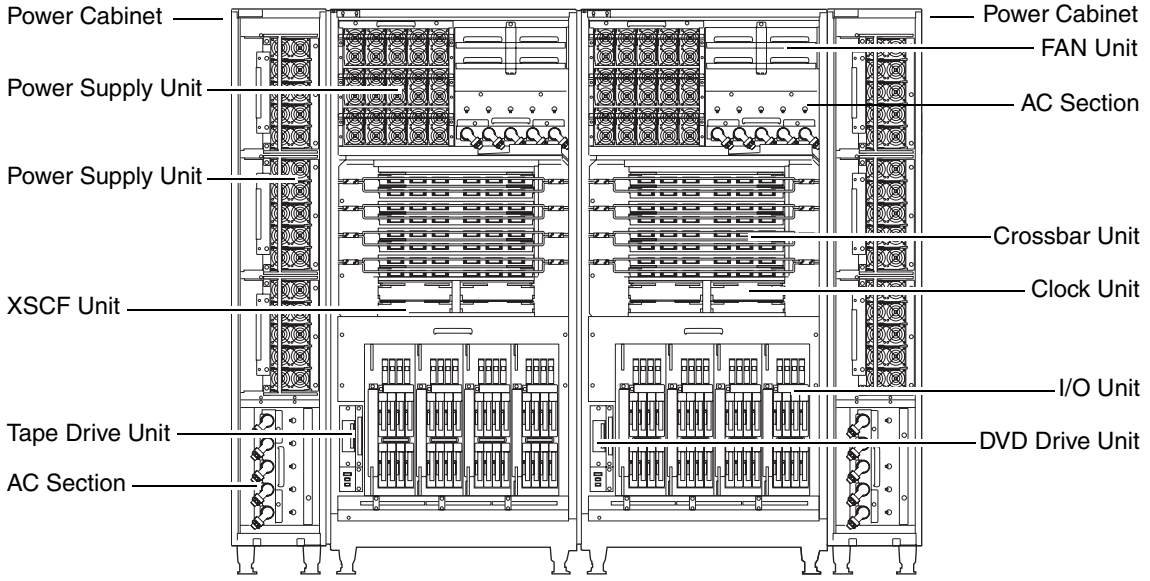


FIGURE 1-8 M9000 (With an Expansion Cabinet) and Power Cabinet Front View

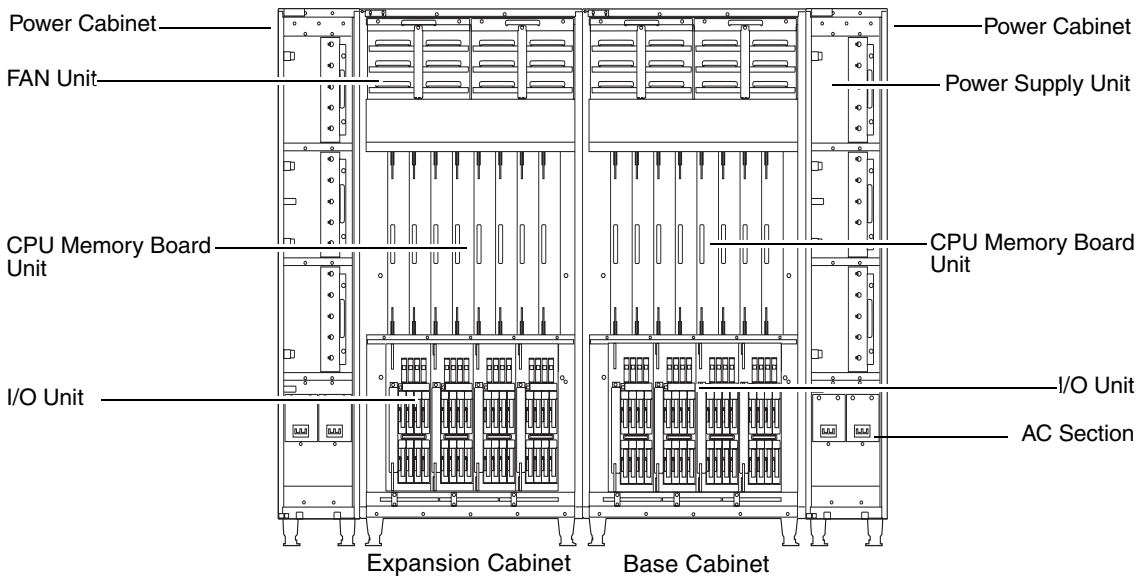


FIGURE 1-9 M9000 (With an Expansion Cabinet) and Power Cabinet Rear View

1.2.8 Operator Panel Overview

The operator panel has LEDs indicating different states of the M8000 and M9000 servers, a power switch for power control, and a mode switch for setting the operation mode.

For details about the operator panel, see the *SPARC Enterprise M8000/M9000 Servers Service Manual.*

The following figure shows the operator panel, and its LEDs and switches are described below.

Operator Panel Appearance

FIGURE 1-10 shows the operator panel.

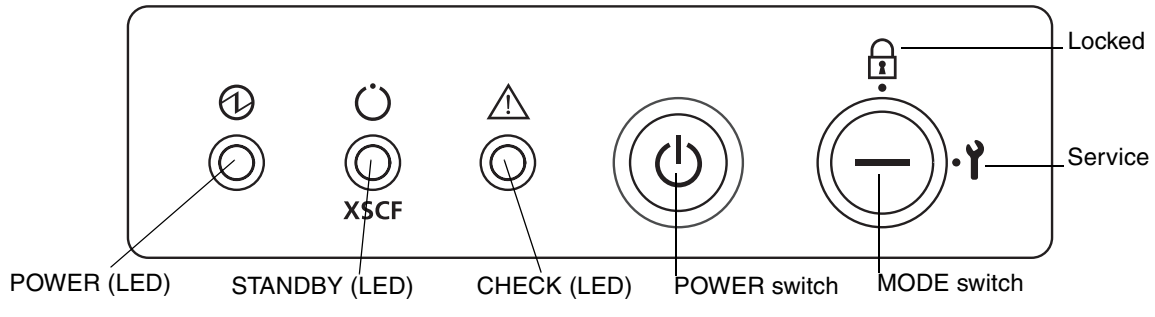


FIGURE 1-10 Operator Panel

Operator Panel LEDs

TABLE 1-5 lists the operating states indicated by the LEDs on the operator panel.

TABLE 1-5 Operator Panel LEDs

LEDs	Name	Light color	Description of function and operating state
	POWER	Green	Indicates whether the main unit power is on. If this LED is on, the power is on.
	STANDBY	Green	Indicates the standby state of the main unit. If this LED is on, the power can be turned on.
	CHECK	Amber	Indicates the main unit operating status. (This is used to indicate a maintenance target, or it indicates that the unit cannot be started.) If this LED is on, a system error has been detected.

Operator Panel Switches

The switches on the operator panel include the mode switch for setting the operation mode and the POWER switch for turning on and off the SPARC Enterprise Server. To switch between system operation mode and maintenance mode, insert the dedicated key of the high-end server and change the mode switch setting.

TABLE 1-6 lists functions of the switches on the operator panel.

TABLE 1-6 Operator Panel Switches

Switch	Name	Function
	POWER switch	Controls the main unit power.
	MODE switch	Selects between maintenance and normal operation. Use the dedicated key managed by the customer to switch between normal and maintenance modes.
	Locked	This mode is set for normal operation.
	Service	This mode is set for maintenance.

1.3 Server Components

This section describes the components of both high-end servers.
For details on each, see the *SPARC Enterprise M8000/M9000 Servers Service Manual*.

- CPU Module
- CPU/Memory Board Unit
- I/O Unit
- FAN Unit
- Power Supply Unit
- Crossbar Unit
- Clock Control Unit
- Operator Panel
- XSCF Unit
- Internal Drive Units
  - Hard Disk Drive
  - DVD-ROM Drive Unit/Tape Drive Unit

1.3.1 CPU Module

The CPU Module (CPUM) contains a SPARC64 VI CPU and a DC-DC converter (DDC). Up to four CPU modules (CPUMs) can be mounted on a CPU/Memory unit.

The CPUM has the following features:

- The CPUM contains a SPARC64 VI, a high-performance multicore CPU that uses the latest LSI process.
- If an unforeseen fault is detected, the SPARC64 VI CPU enables operation to continue without interruption by using an automatic recovery function, automatic retry function, or automatic degradation function, depending on how the system is configured.
- A redundant DDC configuration enables continuous operation even if a DDC fails.

1.3.2 CPU/Memory Board Unit

The CPU/Memory Board Unit (CMU) contains CPUMs, memory modules, and a DDC. The CMU and an I/O units can be combined to construct one or more domains.

The CMU has the following features:

- Contains an interconnect LSI module that uses the latest LSI process.
- Uses Double Data Rate (DDR)II DIMM memory.
- Supports the DR function that enables hot maintenance and replacement of CMUs during system operation, and enables addition and deletion of active CMUs during system operation.
- A redundant DDC configuration enables continuous operation even if a DDC fails.

1.3.3 I/O Unit

The I/O unit (IOU) consists of a PCIe bridge control LSI module, a printed circuit board containing a DDC, a hard disk drive (HDD), PCIe slots, and PCI cassettes for the IOU. The IOU and the CMU can be combined to configure a server.

The IOU has the following features:

- It contains eight PCIe slots.
- The IOU Onboard Device Card_A (IOUA) can be used to connect the in-cabinet disk drive (2.5-inch SAS interface), the in-cabinet DVD-ROM drive, and a tape device. The LAN port (1000BASE-T/100Base-TX/100Base-T) mounted on the card can be used.
- It supports PCI hot-plug for External I/O Expansion Units and PCIe slots.
- An External I/O Expansion Unit can be used to connect the IOU to an External I/O Expansion Unit connection card.
- Supports the DR function that enables active maintenance and replacement of IOUs during system operation and enables addition and deletion of active IOUs during system operation.
- Insert the PCI Card into one of the supplied cassettes before inserting it into a built-in PCIe slot in the IOU. A PCI card whose length is up to 177.8 mm (short size) can be mounted in a slot.
- A redundant DDC configuration enables continuous operation even if a DDC fails.

1.3.4 FAN Unit

The FAN unit is used to cool the server. There are two types of FAN units, with the following features:

- A redundant fan configuration enables continuous system operation even if a fan fails during system operation.
- Hot system maintenance or replacement of a faulty fan can be performed during system operation.

1.3.5 Power Supply Unit

The power supply unit (PSU) feeds power to each unit, and has the following features:

- A redundant configuration enables the system operation to continue without interruption even if a power supply unit fails during system operation.
- Hot system maintenance or replacement of a faulty power supply unit can be performed during system operation.

1.3.6 Crossbar Unit

The crossbar unit (XBU) consists of crossbar switches that logically connect CMUs and IOUs.

The XBU has redundant bus routes. If one route fails, the system can be restarted through the other route to continue operation.

1.3.7 Clock Control Unit

The clock control unit (CLKU) contains an LSI module used for the clock.

The CLKU has redundant clock supply routes. If one route fails, the system can be restarted through the other route to continue operation.

1.3.8 Operator Panel

The operator panel can be used to turn on and off the server power, switch between operation modes, and display system status information.

The operations of switches on the operator panel can be limited by switching the operation mode with the dedicated key supplied for the panel.

1.3.9 XSCF Unit

The XSCF unit (XSCFU) includes a dedicated processor, which operates independently from the main unit processors. The XSCFU in the servers adopts a duplicated configuration to increase fault tolerance.

The XSCFU is equipped with hardware interfaces for network connections to remote devices such as personal computers and workstations. A remote device can be connected via a network to the XSCF to control startup, settings, and operation management of the system.

The XSCFU provides the following hardware interfaces for network connections:

- Serial port
- LAN ports (10/100BASE-T/100Base-TX)

The XSCF can be accessed through network connections using these interfaces. The commandline interface (XSCF shell) and browser-based user interface (XSCF Web pages) provided by the XSCF enable operation and management of the servers.

For details, see the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers XSCF User's Guide*.

1.3.10 Internal Drive Units

The SPARC Enterprise M8000/M9000 servers contain the following in-cabinet drive units. These allow active replacement or addition:

Hard Disk Drive

The hard disk drive is a 2.5-inch hard disk drive with a serial attached SCSI (SAS) interface. It can be mounted in an IOU.

DVD-ROM Drive Unit/Tape Drive Unit

The DVD drive cannot be directly shared by multiple domains in a server. However, if the multiple domains are connected to one another through a LAN and a certain function of the Solaris Operating System is used, the DVD drive can be shared by the domains. Adequate consideration of security is necessary for LAN connections between domains.

1.4 Component Mounting Conditions

- CPUMs can be added in units of two modules.
- Dual inline memory module (DIMMs) can be added in units of 16 modules.
- If you add an IOU, a CMU must be mounted for the slot with the same slot number.
- IOU Onboard Device Card_A (IOUA) can be mounted in PCIe Slot #0, #2, #4, and #6 in the IOU.
- External I/O Expansion Unit connection cards can be mounted in PCIe Slot #1, #3, #5, and #7 in the IOU.

1.5 Optional Products

The following products are the main options available for the SPARC Enterprise M8000/M9000 Servers.

- Power Supply Options
- External I/O Expansion Unit
- SPARC Enterprise M9000 Server (Expansion Cabinet) Option

For information about other optional products, visit our web site.

1.5.1 Power Supply Options

The power cabinet and the rack-mountable dual power feed option for the SPARC Enterprise M8000 server are offered as power supply options.

The power cabinet enables dual power feed or three-phase power feed.

The rack-mountable dual power feed option for the SPARC Enterprise M8000 server receives power from two external AC power sources that are independent of each other, and duplicates the input power system.

To use a single-phase dual power feed configuration for the SPARC Enterprise M8000 server, mount the rack-mountable dual power feed option in the rack space itself. This requires a rack space with a height of 6 RUs in the cabinet. For the SPARC Enterprise M9000 server, you must add the power cabinet.

For three-phase power feed in either server, an additional power cabinet is required. Install one power cabinet for each SPARC Enterprise M8000/M9000 Server.

For details, see the *SPARC Enterprise M8000/M9000 Servers Site Planning Guide.*

Note – A three-phase power feed option can be installed only at the factory before shipment. A single-phase power feed cannot be changed to a three-phase power feed, or vice versa, after shipment from the factory.

TABLE 1-7 lists specifications of the power cabinet.

TABLE 1-7 Specifications of the Power Cabinet and M8000/M9000 Dual Power Feed Option

Item		Rack-mountable Dual Power Feed options	Power Cabinet
Outside dimensions	Width [mm]	489	317
	Depth [mm]	1003	1244
	Height [mm]	278(6U)	1800
Weight [kg]		75	350
Input power: Single-phase power input	Voltage [V]	AC200 to 240 ± 10%	
	Number of phases	Single phase	
	Frequency [Hz]	50/60 +2%, -4%	

Note – For specifications of the three-phase power feed option, see the SPARC Enterprise M8000/M9000 Servers Site Planning Guide.

1.5.2 External I/O Expansion Unit

The External I/O Expansion Unit is an optional product used to add PCI slots. The External I/O Expansion Unit has a height of four RUs (rack units), about 18 cm, in a 19-inch rack.

The External I/O Expansion Unit can accommodate up to two I/O Boats by using either six PCIe slots or six PCI-X slots.

- PCIe slots in each I/O Boat: short size to long size (to 312 mm)
- PCI-X slots in each I/O Boat: short size to long size (to 312 mm)

Also, active addition and replacement is enabled for all slots in the External I/O Expansion Unit.

For details, see the *I/OExpansion Box Installation and Service Manual* .

FIGURE 1-11 shows the External I/O Expansion Unit.

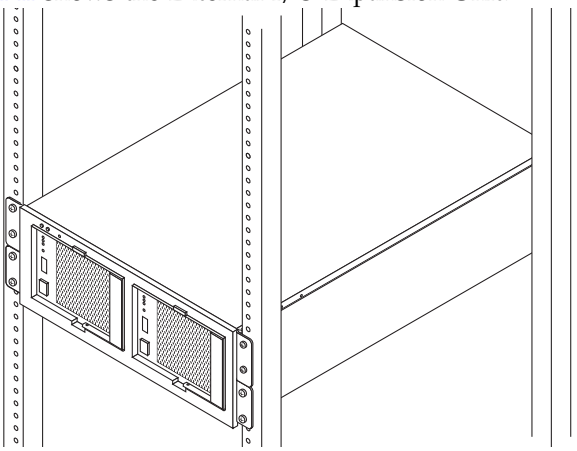


FIGURE 1-11 External I/O Expansion Unit

1.5.3 SPARC Enterprise M9000 Server (Expansion Cabinet) Option

A SPARC Enterprise M9000 Server (base cabinet) configuration can contain up to 32 CPU Modules (64 cores), up to 2TB of memory, and up to 224 PCI slots. A configuration containing more components than described above would require the expansion cabinet option of the SPARC Enterprise M9000 Server.

A configuration with the SPARC Enterprise M9000 Server (expansion cabinet) can contain up to 64 CPU modules (128 cores), up to 4TB of memory, and up to 288 PCI slots.

For information about connecting the SPARC Enterprise M9000 Server (expansion cabinet) and the SPARC Enterprise M9000 Server (base cabinet), see the *SPARC Enterprise M8000/M9000 Servers Installation Guide.*

1.6 Software Features

The SPARC Enterprise M8000/M9000 Servers use XSCF for system administration and monitoring.

The Solaris Operating System can be installed as the operating environment used in a domain.

For details, see Chapter 3.

CHAPTER 2

System Features

This chapter explains the following technical aspects, including features and structures.

- Hardware Configuration
- Partitioning
- Resource Management
- RAS

2.1 Hardware Configuration

This section explains the hardware configuration, which includes the following items:

- CPU
- Memory Subsystem
- I/O Subsystem
- System Bus
- System Control

2.1.1 CPU

The SPARC Enterprise M8000/M9000 Servers use the SPARC64 VI CPU, a proprietary high-performance multi-core processor. On-chip L2 cache memory minimizes memory latency.

An instruction retry function has been implemented so that operation can be continued by retrying an instruction for which an error has been detected.

The SPARC Enterprise M8000 server, SPARC Enterprise M9000 server, and the SPARC Enterprise M9000 server with expansion cabinet take advantage of system scalability by supporting up to 16, 32, or up to 64 CPU modules, respectively.

CPU modules running at different clock frequencies can be used in a single system.

The latest CPUs can therefore be installed when improved processing performance is required.

2.1.2 Memory Subsystem

The memory subsystem controls memory access and cache memory. The server uses DDR-II DIMM memory.

Each CMU has thirty-two memory slots.

Also, the SPARC Enterprise M8000 server, SPARC Enterprise M9000 server, and SPARC Enterprise M9000 server with expansion cabinet can mount up to 128, 256, or 512 DIMMs, respectively.

The memory subsystems use up to eight-way interleaving, providing higher-speed memory access.

Memory mirror mode is supported for every pair of memory buses in a CMU. This enables continued operation using the other non-defective bus if an error occurs in one bus. Memory mirror mode can be set up by the system administrator.

2.1.3 I/O Subsystem

The I/O subsystem controls data transfer between the main unit and I/O devices. These servers use PCIe as the interconnect bus for I/O devices.

Each IOU contains eight-lane (x8) PCIe slots. Also, eight-lane PCIe slots or 133-MHz 64-bit PCI-X slots can be in a mounted through an External I/O Expansion Unit.

The SPARC Enterprise M8000 server, SPARC Enterprise M9000 server, and the SPARC Enterprise M9000 with expansion cabinet can mount up to 32, 64, or 128 PCIe-compatible cards, respectively.

PCI-Express slots or PCI-X slots can be added by mounting an External I/O Expansion Unit through a PCI-Express slot.

2.1.4 System Bus

The CMU containing a CPU and memory subsystem and each component in an IOU containing an I/O subsystem are used for high-throughput data transfer between all components through a crossbar switch. The crossbar switch has duplicated bus routes. If one crossbar switch has an error, the system can be restarted to isolate the faulty switch, enabling the high-end servers to continue operation.

FIGURE 2-1 shows data transfer in the system.

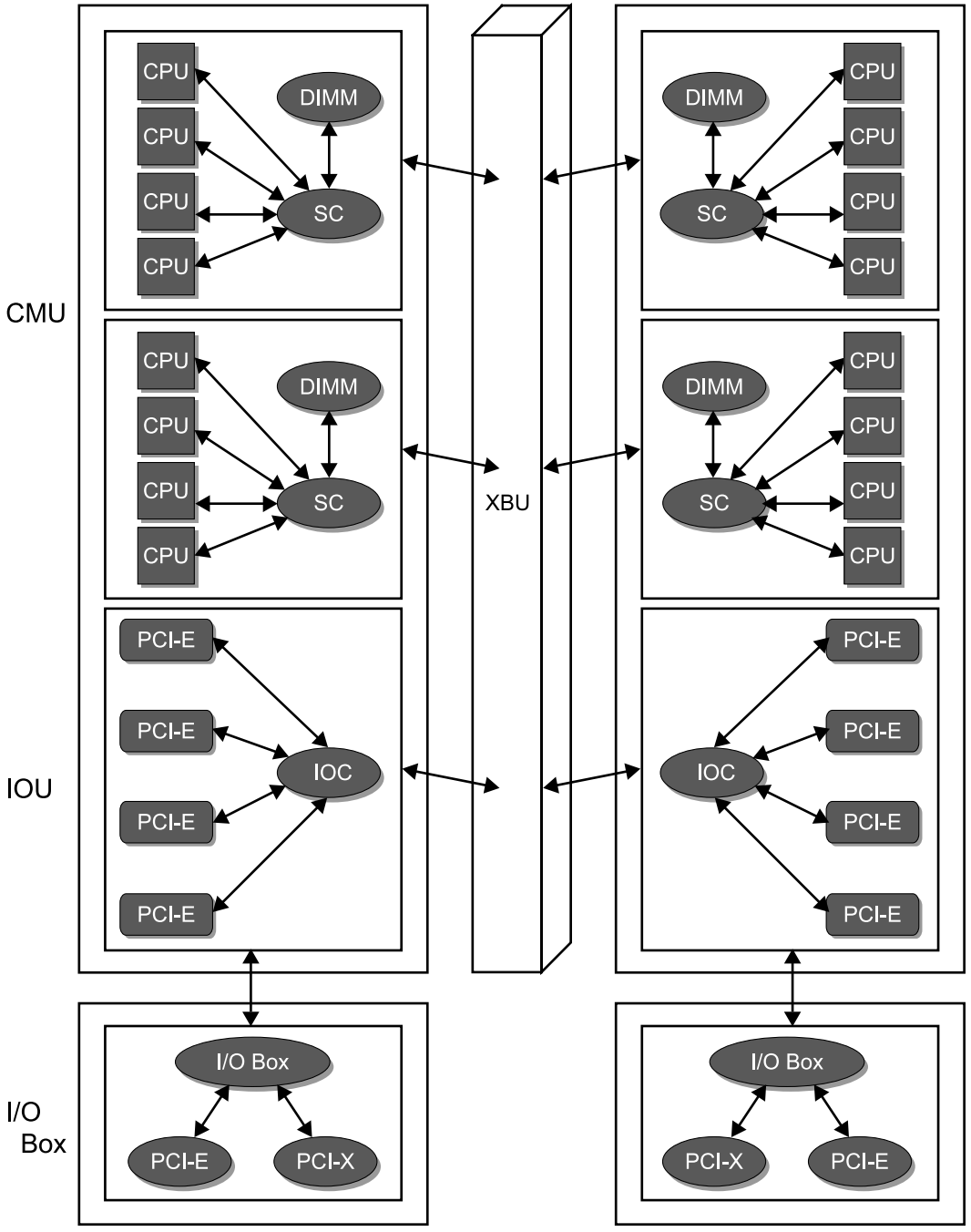


FIGURE 2-1 Main Component Connections

Note – The SC is the system controller that controls CPUs and memory and handles communication with the XB.

2.1.5 System Control

System control of this server refers to the system control contained within the XSCFU that runs the XSCF and every component controlled by the XSCF.

As long as input power is being supplied to the server, the XSCF constantly monitors the server even if all domains are powered off.

The following functions are provided to increase system availability:

- Configuration management and monitoring
- Cooling unit (FAN) monitoring
- Domain status monitoring
- Power-on and power-off of peripheral devices[1]
- Complete control and monitoring of the server through abnormality monitoring
- Remote partitioning for domain configuration and management
- Server management and monitoring functions by the user through an external network connection
- Notifying the system administrator of fault information on the server
- Remote console input-output

2.2 Partitioning

A single SPARC Enterprise M8000/M9000 server cabinet can be divided into multiple independent systems for operation. This dividing function is called partitioning.

This section describes features of partitioning and system configurations that can be implemented through partitioning.

1. The connected device must have the same interface to be effective.

2.2.1 Features

The individual systems resulting from partitioning can be built in the SPARC Enterprise M8000/M9000 Servers. These individual, divided systems are called domains. Domains are sometimes called partitions.

Partitioning enables arbitrary assignment of resources in the server. Partitioning also enables flexible domain configurations to be used according to the job load or processing amount.

An independent operating system can run in a domain. Each domain is protected by hardware so that it is not affected by other domains. For example, a software-based problem, such as an OS panic, in one domain does not directly affect jobs in the other domains. Furthermore, the operating system in each domain can be reset and shut down independently.

2.2.2 Domain Hardware Requirements

The basic hardware resources making up a domain are a CMU and IOU mounted in the high-end servers or a physical system board (PSB) consisting of a CMU.

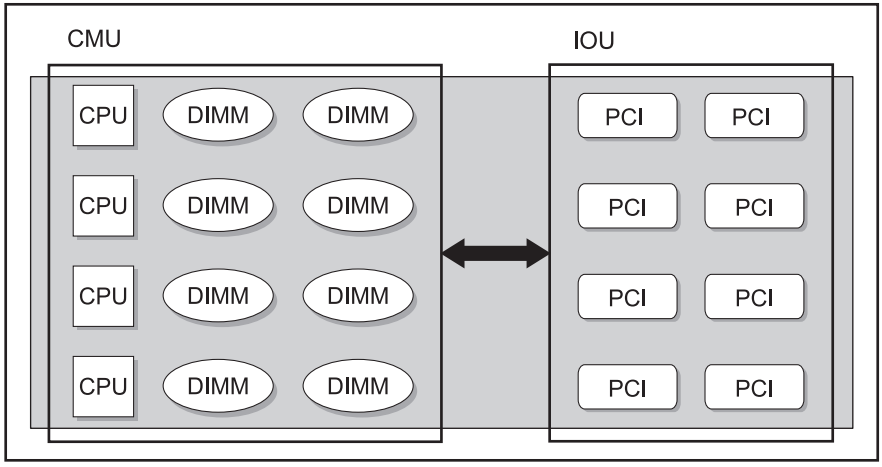
A PSB can be logically divided into one part (no division) or four parts. The physical unit configuration of each divided part of a PSB is called an extended system board (XSB).

A PSB that is logically divided into one part (no division) is called a Uni-XSB, and a PSB that is logically divided into four parts is called a Quad-XSB.

A domain can be configured with any combination of these XSBs. The XSCF is used to configure a domain and specify the PSB division type.

FIGURE 2-2 shows the partitioning division types.

- Uni-XSB types



- Quad-XSB types

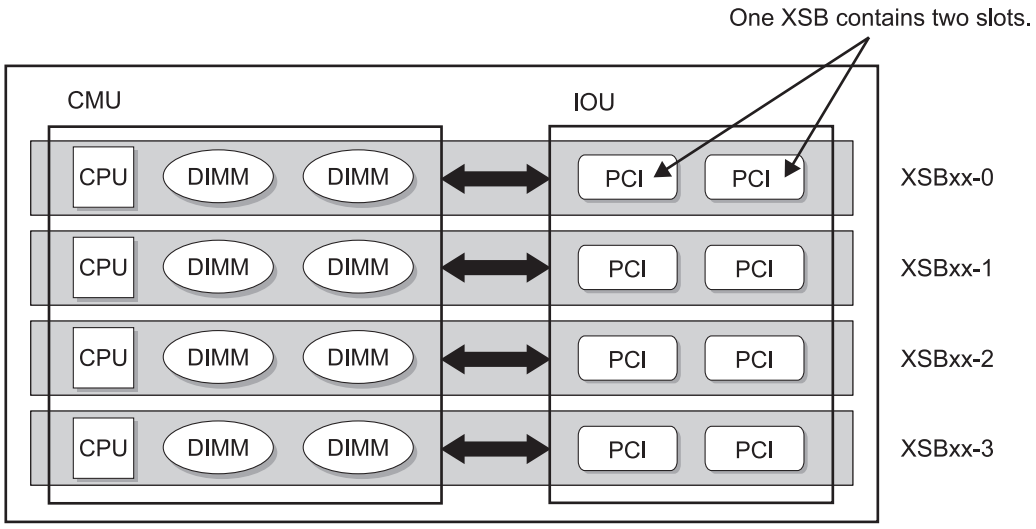


FIGURE 2-2 Partition Division Types

2.2.3 Domain Configuration

Any XSBs in the server can be combined to configure a domain, regardless of whether the divided XSB is the Uni-XSBs or Quad-XSBs.

These XSBs can be used in any combination for a flexible domain configuration. Also, the quantity of resources for one XSB can be adjusted according to the division type of a PSB. Thus, a domain can be configured based on the quantity of resources required for job operations.

XSCF user interfaces are used to configure a domain. Each configured domain is managed by the XSCF.

The maximum number of domains that can be configured in the servers depends on the system. Up to 16 domains can be configured in SPARC Enterprise M8000 servers, and up to 24 domains can be configured in SPARC Enterprise M9000 servers.

To configure a domain, an LSB number must first be assigned so that a logical system board (LSB) can function as an LSB of the XSB.

This LSB number is referenced by the Solaris Operating System, and it must be a unique number in the domain. However, if one XSB is shared by multiple domains, a common LSB number need not be defined in the domains. An arbitrary LSB number can be assigned for this setting in each domain.

Domain configuration settings are made for each domain. A domain can be configured by specifying an XSB together with this LSB number.

Up to 16 XSBs can be configured in a single domain.

The following as well as the quantity of resources must be considered by the user who is specifying the domain configuration and division type:

- The Uni-XSB type is suitable in the configuration of a domain requiring a large quantity of resources. Also, an XSB of the Uni-XSB type is separated by the physical configuration units of a CMU and IOU. Thus, if a hardware error occurs in a CPU or memory, hardware can easily be replaced without affecting other domains. However, a resource quantity decrease due to an error may be in the range specified by the PSB.
- Quad-XSB type is suitable in the configuration of a small-scale domain, and optimized for flexible resource management. However, since domains are logically separated in a PSB, an error in the hardware shared within the PSB may affect other domains.

In addition, resources of a configured domain can be added to and deleted from individual XSBs, and they can be moved between domains.

FIGURE 2-3 shows the domain configuration.

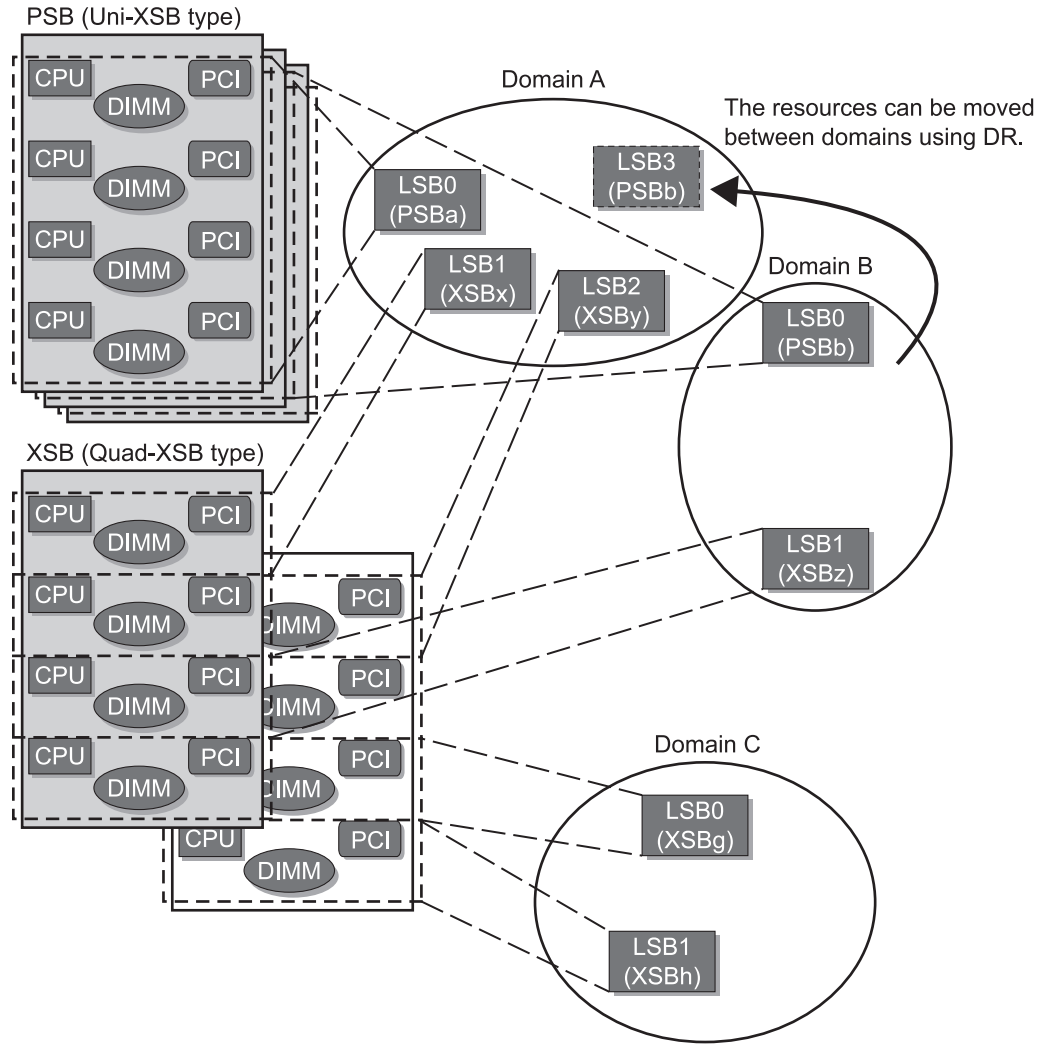


FIGURE 2-3 Domain Configuration

2.3 Resource Management

This section explains the following functions that support dynamic reconfiguration of domain resources during system operation:

- Dynamic Reconfiguration
- PCI Hot-plug
- Capacity on Demand
- Zones

2.3.1 Dynamic Reconfiguration

Dynamic reconfiguration (DR) enables hardware resources on system boards to be added and removed dynamically without stopping system operation. DR thus enables optimal relocation of system resources. Also, if a failure occurs, DR can place the system in a state that enables active replacement of the faulty component.

Using the DR function enables additions or distributions of resources as required for job expansions or new jobs, and it can be used for the following purposes.

- Effective use of system resources

  By reserving some resources, the reserved resources can be added according to changes in the work load occurring daily, monthly, or annually. This enables flexible resource allocations on the system that needs to operate 24 hours a day, every day of the year in accordance with changes in the amount of data and the work load.

- Active replacement of system resources

  If a failure occurs in a CPU for a domain that has been configured with system resources of multiple system boards, the DR function enables the faulty CPU to be isolated dynamically without stopping the system. The replacement CPU can be configured dynamically in the original domain.

For details on Dynamic Reconfiguration, see the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers Dynamic Reconfiguration (DR) User's Guide.*

2.3.2 PCI Hot-plug

The PCI hot-plug function enables PCI cards to be added or removed under the Solaris Operating System without a system reboot.

Examples of uses for the PCI hot-plug function are as follows:

- Replacing or removing a faulty PCI card or one that will probably become faulty, during system operation
- Adding a PCI card during system operation

For details on the PCI hot-plug function, see the *SPARC Enterprise M8000/M9000 Servers Service Manual*.

2.3.3 Capacity on Demand

Capacity on Demand (COD) is an optional service that allows the user to purchase spare processing resources (CPUs) for the servers. The spare resources are provided in the form of one or more CPUs on COD boards that are installed on your server. However, to access these CPUs, you must first purchase the COD right-to-use (RTU) licenses for them.

Note – RTU means a license applicable to each CPU. To use CPUs with the extra number of CPU RTUs purchased beforehand, the user needs to purchase additional RTUs processors on each system board. The right-to-use license for CPUs specifies the number of CPUs that can be used in the entire system. The system administrator decides the system boards and domains to which the Right to Use is to be assigned.

The right-to-use license for CPUs specifies the number of CPUs that can be used in the entire system. The system administrator decides the system boards and domains to which the Right to Use is to be assigned.

For details on RTU assignment, see Section 3.2.2.6, “Resource Management” on page 3-5.

For details on COD, see the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers Administration Guide.*

2.3.4 Zones

The Solaris 10 OS has a function called Zones that divides the processing resources and allocates them to applications.

In a domain, resources can be divided into sections called containers, and the processing sections are allocated to each application. The processing resources are managed independently in each container. If a problem occurs in a container, the container can be isolated so that it does not affect other containers. It provides flexible resource allocation that enables optimal resource management with consideration given to the processing load.

2.4 RAS

RAS is an acronym for functions related to Reliability, Availability, and Serviceability.

RAS for SPARC Enterprise M8000/M9000 servers minimizes system downtime by providing for error checking at appropriate locations and by providing centralized monitoring and control of error checking.

Also SPARC Enterprise M8000/M9000 servers can be configured with clustering software or centralized management software to enhance the RAS function.

Any scheduled system halt, such as a periodic maintenance or system configuration change can also be performed without affecting operating resources. This can improve service uptime significantly.

2.4.1 Reliability

To improve quality and gain high reliability, you must select appropriate components considering the lifetime of the products and response at the time of error occurrence.

Reliability is equally important to both hardware and software.

Furthermore, software errors are not only triggered by program errors, but also by hardware errors.

SPARC Enterprise M8000/M9000 servers provide the following functions to realize high reliability.

- Monitoring by the XSCF to periodically check whether software such as the Solaris Operating System is running in domains (host watchdog monitoring).
- Memory patrol is periodically performed to detect memory software errors and stuck faults, even in memory areas not normally used, to prevent use of faulty memory and thereby prevent system failures caused by faulty memory from occurring.

- Since ECC protects functional data in all routes including a computing unit, a register, cache memory, and a system bus, all 1-bit errors can be automatically corrected by hardware to ensure data integrity.

2.4.2 Availability

Availability is characterized by how easily a server fails and how quickly the user can be recovered from the failure. The amount of time the system is usable is represented as a percentage.

Hardware and software faults in the system cannot be completely eliminated. To provide high availability, the system must include mechanisms that enable continuous system operation even if a failure occurs in hardware, such as components and devices, or in software, such as the operating system, or application software.

SPARC Enterprise M8000/M9000 servers provide the functions listed below to obtain high availability. Higher availability can also be obtained by combining the server with clustering software or management software.

- Supporting redundant configurations and hot replacement of power supplies and fans
- Supporting redundant configuration of disks, mirroring by software and active replacement
- Extended range of automatic correction of temporary faults in memory, system buses, and LSI internal data
- Support of an enhanced retry function and degradation function for detected faults
- Shortening the downtime by using automatic system reboot
- Shortening the time taken for system startup
- XSCF collection of fault information, and preventive maintenance using different types of warnings
- Supporting the Chipkill function in the memory subsystem, which enables single-bit error correction to continue processing in response to continuous burst read errors caused by failures of a memory device
- Supporting the memory mirroring function enables normal data processing through the other memory bus, thereby preventing system failures in response to an error at the bus or device connected to memory bus
- Memory patrol function has no influence on the workload of software operation because it is implemented in hardware

2.4.3 Serviceability

Serviceability is characterized by how easily a server fault can be diagnosed, and how quickly the server can be recovered from the fault or how easily the fault can be corrected.

To achieve high serviceability rates, it must be possible to identify the causes of component or device failure. To facilitate recovery from failure, the system must determine the cause of the failure and isolate the faulty component for replacement. The system must also notify the system administrator and/or field engineer of the event and situation in an easy-to-understand format that prevents misunderstandings.

SPARC Enterprise M8000/M9000 servers provide the following solution to realize high serviceability:

- Status LEDs mounted on the operator panel, indicating the main replaceable components and the components to which active replacement is applicable
- Remote recognition of the device operating status and remote maintenance using the XSC
- LED blinking function for indicating the maintenance target (CHECK-LED, which is also called a locator)
- Notes and cautions marked on different types of labels provided for the system administrator and field engineers
- Automatic notification for reporting different types of faults to the system administrator and field engineers
- Centralized systematic monitoring, such as supporting SNMP, of a complex system from a data center

CHAPTER 3

About Software

This chapter explains the following software functions.

- Solaris Operating System Functions
- XSCF Firmware Function

3.1 Solaris Operating System Functions

The Solaris Operating System (Solaris OS) has the following features:

- Solaris reliability that has been built over the years
- Affinity that fully brings out the hardware performance of the SPARC architecture.
- A variety of products from ISVs (application software and middleware)
- Resource optimization using the partitioning and DR functions
- Dynamic addition/change of IO device using PCI hot plug
- Resource management with Solaris zones using Solaris container technology
- Advanced system management in cooperation with XSCF

For details of the Solaris Operating System, see the manual on the following URL.

`http://docs.sun.com`

Irrespective of the capabilities of the software suite, the Solaris Operating System has the following functions for communicating with the SPARC Enterprise server hardware:

- Domain Management
- PCI Hot-plug

3.1.1 Domain Management

In the SPARC Enterprise M8000/M9000 Servers servers, a physical system board (PSB) can be logically divided into one part (no division) or four parts by a partitioning function unique to the system.

A PSB that is logically divided into one part (no division) is called a Uni-XSB, and a PSB that is logically divided into four parts is called a Quad-XSB.

The physical unit configuration of each divided part of a PSB is called an extended system board (XSB).

In the SPARC Enterprise system, a domain can be configured with any combination of these XSBs.

3.1.2 PCI Hot-plug

SPARC Enterprise M8000/M9000 servers support insertion and removal of PCI cards for specific PCI-Express and PCI-X hot-plug controllers. Before removing the PCI card, be sure to cancel the settings and isolate the card by using the Solaris OS `cfgadm(1M)` command, and make sure that the card is physically removable.

For details of PCI hot-plug, see the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers Administration Guide*.

3.2 XSCF Firmware Function

The XSCF firmware is a System Control Facility including a dedicated processor that is independent from the processors in the server. This section describes XSCF firmware features and provides an overview of XSCF firmware functions.

3.2.1 XSCF Features

The XSCF is firmware that is preinstalled, and operates on the XSCFU as standard equipment. As long as input power is being supplied to the server, the XSCF constantly monitors and manages the server even if the power to domains is turned off. In addition, the XSCF provides a user interface from which users can operate and manage the server.

The XSCFU has a serial port and LAN port as external interfaces. A terminal such as a personal computer or workstation can be connected to the XSCF through a serial connection or Ethernet connection.

The servers can be operated and managed from the command line-based XSCF shell or browser-based XSCF Web pages provided by the XSCF.

Only the XSCF shell can be used through the serial connection. Both the XSCF shell and XSCF Web pages can be used through the Ethernet connection.

Note – The XSCFU supports a redundant configuration (duplicate configuration) for high reliability.

The XSCF that is currently in control of the server is called the active XSCFU, and the other XSCF is called the standby XSCF or standby XSCFU since it serves as the backup XSCF to the active one.

The active XSCF and standby XSCF monitor each other to implement a failover mechanism to switch between the active XSCF or standby XSCF when one of them detects and error in the other.

For details on functions provided by the XSCF, see Section 3.2.2, "XSCF Functional Overview" on page 3-4, and the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers eXtended System Control Facility (XSCF) User's Guide*.

3.2.1.1 Command Line-based User Interface (XSCF shell)

The XSCF shell is a command line-based user interface that can be used from a terminal, such as a personal computer or workstation, connected to the XSCF through a serial connection or Ethernet connection.

With the serial connection, the terminal is connected directly to the server to use shell commands provided by the XSCF. Also, the console redirection function of the XSCF enables the terminal to be used as an operating system console.

With the Ethernet connection, the terminal is connected to the XSCF via Secure Shell (SHH) or telnet to use shell commands provided by the XSCF.

The following are the main operations that can be performed with the XSCF shell:

- Display the server configuration or status and various related settings
- Display the domain configuration or status and various related settings
- Start or shut down a domain
- Make settings for various network services
- Make settings for various security functions

- Make various settings for the remote maintenance service function

3.2.1.2 Browser-Based User Interface (XSCF Web)

XSCF WEb is a browser-based user interface that can be used from a terminal, such as a personal computer or workstation, connected to the server through an Ethernet connection.

However, the XSCF Web pages cannot be used through a serial connection. If the browser function of a terminal is used for a connection to the XSCF, BUI operations can be performed.

3.2.2 XSCF Functional Overview

This section provides an overview of the main functions supported by the XSCF.

For details on each function, see the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers eXtended System Control Facility (XSCF) User's Guide*.

3.2.2.1 System Management

The main tasks of the XSCF are control and monitoring of the entire SPARC Enterprise system, such as configuration management and monitoring of the server's cooling components (FAN units), domain status monitoring, power-on and power-off of peripheral units, and error monitoring. Also, the XSCF provides a partitioning function for domain configuration and management.

The XSCF constantly monitors the server status so that the system can operate stably.

When any error is detected in the system, the system status monitoring mechanism immediately collects error information about the hardware (hardware log) and analyzes it to identify the error location and check the error status. The XSCF displays the status, and it degrades the relevant component or domain as necessary or it resets the system, thereby preventing the error from occurring again.

The XSCF provides high reliability, high availability, and high serviceability for the entire system.

3.2.2.2 Security Management

The XSCF manages user accounts for the XSCF. The operating range in the XSCF shell and XSCF Web pages can be limited based on user account types and settings. Moreover, the XSCF provides an IP address filtering function for permitting access to

the XSCF and an encryption function using SSH and SSL. Operator errors and unauthorized access during system operation are recorded in a log. The system administrator can use these functions to investigate the cause of a system problem.

3.2.2.3 System Status Management

The XSCF provides functions as XSCF operations for displaying the system configuration status, creating and changing a domain configuration definition, and starting and stopping domains. Also, the XSCF provides the DR function, which assists in dynamically changing a system board configuration during domain operation. Thus, domain resources can be optimized for job operations. Moreover, the XSCF in linkage with the Solaris Operating System manages CPU, memory, and I/O resources.

3.2.2.4 Error Detection and Management

The XSCF constantly monitors the system status so that the system can operate stably. When any error is detected in the system, the XSCF immediately collects error information about the hardware (hardware log) and analyzes it to identify the error location. To continue operation, the XSCF degrades the relevant component or domain as necessary according to error conditions or it resets the system, thereby preventing the problem from occurring again. The user can take prompt action for problems since easy-to-understand and accurate information on hardware errors and fault locations are thus provided to the user.

3.2.2.5 Remote System Control and Monitoring

The XSCF provides functions for monitoring the server through an Ethernet connection so that the user can remotely manage the server. Moreover, a function for reporting error information to the system administrator and a remote console input-output function are supported. System availability is thus increased.

3.2.2.6 Resource Management

XSCF manages hardware resources on configured domains and system boards. As for the resource management, DR function that enables dynamic reconfiguration of domains is provided. Moreover, COD is provided to realize resource management CPUs that is purchased by license.

Dynamic Reconfiguration (DR)

The XSCF assists in dynamically changing a system board configuration during system operation. The XSCF can be used for dynamic reconfiguration of domains.

For details on DR, see the *SPARC Enterprise M8000/M9000 Servers Service Manual*.

Capacity on Demand (COD)

To use CoD, RTUs must be purchased. Then, resources such as CPUs must be configured according to the number of purchased RTUs so that they can be used as needed. The licenses that are defined are allocated to individual resources when such resources are required for use because of the start of a domain or another trigger.

For details, see the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers Administration Guide.*

Glossary

B

BUI Browser-based user interface.

C

Capacity on Demand (COD) An option that provides additional CPU processing resources when needed. These additional CPUs are provided on COD CPU boards that are installed in the server. To access the COD CPUs, you must purchase the COD right-to use (RTU) licenses for them.

CLI Command-line interface.

clock control unit (CLKU) Unit consisting of the clock board and mechanical components. This is an active replaceable unit.

CLKU See *clock control unit (CLKU)*.

CPU Central processing unit.

CPU/Memory Board unit (CMU) In the SPARC Enterprise M8000/M9000 servers the CPU/Memory unit consists of the CPU, memory and CMU channel.

CPUM See *CPU module (CPUM)*.

CPU module (CPUM) A module containing one or two CPU chip(s).

crossbar (XB) The switch ASIC that controls the transfer of data between the System Controller (SC) and the I/O.

Crossbar unit (XBU) The board that mounts the crossbar large-scale integration (XB ASICs). The crossbar unit is used in the SPARC Enterprise M9000 model. In the SPARC Enterprise M9000 with Expansion Cabinet model, the cable among crossbar units connect each chassis.

D

dual power feed Type of power feed for the high-reliability system that contains dual lines of power supply. If one line has stopped, the other line does not stop and enables the system to continue operation.

dynamic reconfiguration (DR) Enables logical attachment and detachment of system boards to and from the system without causing system downtime. This is the process of physically installing or removing a system board while the Solaris OS is running.

Enables boards to be electrically isolated (`deleteboard`) from a domain so they can be physically removed from the system or added to a different domain; or to be electrically reattached (`addboard`) so they can be inserted into a running server or assigned to a different domain.

E

ECC Error Correction Code.

eXtended system board (XSB) eXtended System Board combines the hardware resources of a physical system board. The SPARC Enterprise servers can generate one or four XSB(s) from one physical system board: Uni-XSB and Quad-XSB.

eXtended System Control Facility (XSCF) The software that runs on the Service Processor and provides control and monitoring functions for the server.

eXtended System Control facility unit (XSCFU) The server XSCF board that contains system administration function and operates with independent processor.

F

fan A device that moves air currents into and out of the server.

firmware Firmware is the software that controls the server. The SPARC Enterprise M8000 and SPARC Enterprise M9000 servers have the following firmware; OpenBoot PROM, POST, XSCF. *See XSCF*.

The SAS controller, the GbE controller and control program for External I/O Expansion Unit can be considered as firmware.

I

I/O unit (IOU) The I/O unit, which is common to midrange and high-end servers, monitors I/O events and supports PCIe. Further, midrange server supports PCI-X cards. The PCI cards must first be inserted in a PCI cassette. The I/O unit for the midrange servers supports up to five PCI cassettes: four PCI-Express cassettes (upper four slots) and one PCI-X cassette (lowest slot).

IOU See *I/O unit (IOU)*.

L

logical system board (LSB) The unit of grouping for memory, CPU and I/O, that is visible to software. The physical system board (PSB) or eXtended System Board (XSB) assigned with the system board number on the domain is recognized as the logical system board. One domain consists a maximum of 16 logical system boards. These can be a combination of XSBs and PSBs.

LSB See *logical system board (LSB)*.

M

mode switch A physical key switch on the server that controls system modes: locked and service.

O

operator panel (OPNL) A panel containing system indicators, the cabinet power control button, and the cabinet mode switch.

OS Operating system.

P

PCI cassette A container for a PCI card. There are two varieties: PCIe and PCI-X.

PCIe See *PCI-Express (PCIe)*.

PCI-Express (PCIe) A high-speed serial, point-to-point interconnect.

PCI hot plug (PHP) Active insert or removal of the PCI card, which supports the PCI slot in the server, during system operation.

PCI-X A faster version of the parallel bus PCI standard. The PCI-X bus has improved protocols and a faster clock rate.

PHP See *PCI hot plug (PHP)*.

physical system board (PSB) One physical system board (PSB). PSB offers the CMU configuration and the CMU and IOU configuration.

power supply unit (PSU) Receives AC input and supplies with multiple voltages.

Q

Quad-XSB The divided system board configured with the hardware resource on a physical system board, which is segmented into four. See eXtended system board.

R

RCI See remote cabinet interface.

S

SAS Serial Attached SCSI, an industrial standard serial-based hard drive interface.

serial attached SCSI (SAS) An evolution of parallel SCSI into a point-to-point serial peripheral interface in which controllers are linked directly to disk drives. SAS is an improvement over traditional SCSI because SAS enables multiple devices of different sizes and types to be connected with thinner and longer cables.

Service Processor A small system, that operates with an independent processor and directs the system startup, reconfiguration, and fault diagnosis, plus giving access to the domain(s). This is where the system management software (XSCF) runs.

U

Uni-XSB The system board with the undivided hardware resource on a PSB.

X

XSB See *eXtended system board (XSB)*.

XSCF See *eXtended System Control Facility (XSCF)*.

XSCF Shell See *CLI*.

XSCF Web See *BUI*.

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